

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : FUJI XEROX CO LTD

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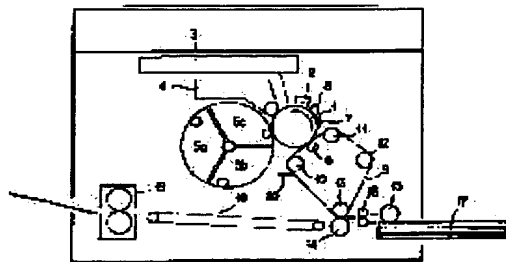
(72)Inventor : HANDA OSAMU
OKUNO TATSUO
FUKUDA YUICHI

(54) IMAGE FORMING METHOD

(57)Abstract:

PURPOSE: To reproduce a sharp black character and black line not having the decrease of a transfer rate, in an image forming device for making a full color copy by using an intermediate transfer body.

CONSTITUTION: In this image forming method for transferring a full color image in such a manner that a latent image formed on an image carrier is developed with charged color toner of yellow, magenta and cyan and black and each developed image is successively and primarily transferred to the intermediate transfer body 9 by a transfer means to which a voltage having a polarity opposite to that of the toner is applied to be superimposed and then secondarily transferred to another transfer material, the intermediate transfer body 9 has 10^8 – $10^{12} \Omega \text{ cm}$ semiconductivity, each image developed with yellow, magenta and cyan is transferred to the intermediate transfer body 9 and then, the image developed with the black toner is transferred to the intermediate transfer body 9.



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- [Number of appeal against examiner's decision of rejection]
- [Date of requesting appeal against examiner's decision of rejection]
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JAPANESE

[JP,08-248779,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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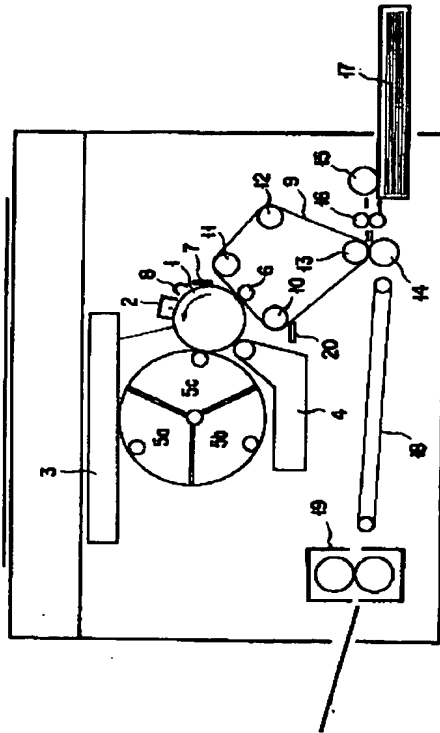
CLAIMS

[Claim(s)]

[Claim 1] The yellow and Magenta which were charged in the latent image formed on the image support, the color toner of cyanogen, And after developing negatives with a black toner, imprinting each developed image on a middle imprint object primarily and laying it on top of it one by one with the imprint means which impressed the voltage of a toner and a reverse pole In the image formation method which formed the full color picture by imprinting secondarily to other imprint material The image formation method characterized by imprinting the developed image by the black toner on a middle imprint object after the above-mentioned middle imprint object's having the half-conductivity of 10⁸-10¹²-ohmcm and imprinting each developed image by yellow, the Magenta, and cyanogen on a middle imprint object.

[Translation done.]

Drawing selection [Representative drawing] 



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[JP,08-248779,A]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the image formation method in color picture formation equipments which used the middle imprint object, such as an electrophotography copying machine and a printer.

[0002]

[Description of the Prior Art] Once imprinting primarily the toner image (developed image) formed on image supporters, such as a photo conductor drum, on middle imprint objects other than an imprint form as the image formation method (the imprint method) in color picture formation equipments, such as an electrophotography copying machine, the method of imprinting the toner image on a middle imprint object secondarily to up to an imprint form anew, and obtaining a copy image is learned.

[0003] And having the effect that generating of gap of the poor multiplex imprint by many factors, such as thickness of the maintenance state of an imprint form and an imprint form and the front-face nature of a lumbus and an imprint form, and color registration can be suppressed by using this method is known.

[0004] The image formation equipment shown in drawing 1 explains the conventional image formation method using this middle imprint object. In drawing 1, 1 is a photo conductor drum and rotates in the direction shown by the arrow all over drawing. Opposite arrangement of the electrification machine 2, a photographic filter 3, the black toner development counter 4, the color toner development counters 5a, 5b, and 5c, the primary transfer roller 6, the photo conductor drum cleaner 7, and the **** lamp 8 is carried out from the hand-of-cut upstream of this in the position which counters the front face of this photo conductor drum 1 at order.

[0005] Nine in drawing is the middle imprint belt arranged so that a part may contact the front face of the photo conductor drum 1 in a primary imprint position, this is laid [firmly] across the surroundings of a drive roll 10, the WOKU amendment roll 11, a tension roll 12, and the back up roll 13 for a secondary imprint, and the above-mentioned primary transfer roller 6 is arranged inside the contact section to the photo conductor drum 1 of this middle imprint belt 9.

Moreover, the secondary transfer roller 14 has countered the back up roll 13 for a secondary imprint.

[0006] The developed image by the toner imprinted by the middle imprint belt 9 by operation of the primary transfer roller 6 is imprinted in response to an operation of the secondary transfer roller 14 by the imprint form 17 fed with the feed roll 15 and the resist roll 16. And the imprint form 17 with which this developed image was imprinted is sent to a fixing assembly 19 with the conveyance belt 18, and it is fixed to it. 20 is a middle imprint belt cleaner which cleans the toner which remained on the middle imprint belt 9.

[0007] With the image formation equipment constituted as mentioned above, formation of a picture is performed as follows. That is, the photo conductor drum 1 begins rotation by the copy

operation start signal, the front face of the photo conductor drum 1 is charged in predetermined potential with the electrification vessel 2, and a latent image is formed of a photographic filter 3. This latent image moves according to rotation of the photo conductor drum 1, and is developed by one of the black toner development counter 4 and the color toner development counters 5a, 5b, and 5c at the developed image by the toner of one color.

[0008] In accordance with the above-mentioned developed image formation operation, the middle imprint belt 9 is also running by the peripheral speed and ***** of the photo conductor drum 1, the developed image by the toner on the above-mentioned photo conductor drum 1 which moved to the primary imprint position where the photo conductor drum 1 and the middle imprint belt 9 contact is imprinted by the middle imprint belt 9 by operation of the toner impressed to the primary transfer roller 6, and the electric field produced with the voltage of reversed polarity, and a primary imprint is performed.

[0009] On the other hand, it is removed by the photo conductor drum cleaner 7, the surface potential of the photo conductor drum 1 is discharged with the electric discharge lamp 8, and image formation operation of the following color is equipped with the toner which remained on the photo conductor drum 1 at this time. The developed image full color on the middle imprint belt 9 by which the multiplex imprint was carried out is obtained by changing the color toner development counters 5a, 5b, and 5c, and repeating the above-mentioned process successively.

[0010] During operation of the above primary imprint, it is estranged from the middle imprint belt 9 so that the secondary transfer roller 14 and the middle imprint belt cleaner 20 of a secondary imprint means may not disturb the developed image on the middle imprint belt 9, and the imprint form 17 sent out with the feed roll 15 is also standing by in the resist roll 16 neighborhood.

[0011] While the imprint form 17 is sent to a secondary imprint position with the resist roll 16 in accordance with the developed image on the middle imprint belt 9 which the primary imprint ended moving to a secondary imprint position, the secondary transfer roller 14 contacts the middle imprint belt 9. And current is given to the tooth back of the imprint form 17 by operation of the toner impressed to this secondary transfer roller 14, and the electric field produced with the voltage of reversed polarity, and the developed image on the middle imprint belt 9 is imprinted by this operation on the imprint form 17.

[0012] The conveyance belt 18 is adsorbed, the imprint form 17 which the secondary imprint ended is conveyed to a fixing assembly 19, and fixing is performed. The remains toner on the middle imprint belt 9 is removed by the middle imprint belt cleaner 20, and the next image formation operation is equipped with it.

[0013] In the color electrophotography equipment using above-mentioned intermediate field, since the middle imprint belt 9 was charged whenever it repeats a primary imprint, there was a problem that the rate of a primary imprint became low. On the other hand, with the technology indicated by JP,4-319968,A, in order to prevent the clearness of a black character and the linea nigra being lost by decline in this rate of an imprint, the method of developing and imprinting a black toner first is taken.

[0014]

[Problem(s) to be Solved by the Invention] However, when the conventional method mentioned above was used, it had the following problems. The middle imprint hair side of belt side is smoother than paper etc. in order to prevent poor cleaning. Therefore, the adhesion force to the middle imprint belt of the toner of the developed image primarily imprinted on this middle imprint belt is weak compared with the adhesion force to paper, and the toner of the developed image primarily imprinted on the middle imprint belt is easy to carry out reverse transcription to the photo conductor drum 1 at the time of the imprint of the following color.

[0015] Therefore, first, whenever the toner of development / developed image imprinted primarily repeats the primary imprint of a developed image besides after that, reverse transcription of it is carried out, and its amount of toners finally imprinted on an imprint form will

decrease remarkably. Therefore, although shown in JP,4-319968,A, like, development / the amount of black toners which will be imprinted on copy material as mentioned above if it imprints primarily decreased remarkably, and the problem that reappearance of a clear black character and the linea nigra was not obtained had generated the black toner first.

[0016] this invention aims at offering the image formation methods, such as an electrophotography copying machine using the clear black character which was made in view of the above-mentioned thing, and does not have decline in the rate of an imprint, and the middle imprint object which enabled reappearance of the linea nigra.

[0017]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the image formation method concerning this invention The yellow and Magenta which were charged in the latent image formed on the image support, the color toner of cyanogen, And after developing negatives with a black toner, imprinting each developed image on a middle imprint object primarily and laying it on top of it one by one with the imprint means which impressed the voltage of a toner and a reverse pole In the image formation method which formed the full color picture by imprinting secondarily to other imprint material After the above-mentioned middle imprint object's having the half-conductivity of 108-1012-ohmcm and imprinting each developed image by yellow, the Magenta, and cyanogen on a middle imprint object, it is made to imprint the developed image by the black toner on a middle imprint object.

[0018]

[For **] By this image formation method, since the developed image by the black toner is primarily imprinted after imprinting the developed image by yellow, the Magenta, and cyanogen primarily on a middle imprint object, reverse transcription of the black toner is not carried out to the image support which is a photo conductor. And when the middle imprint object has the half-conductivity of 108-1012-ohmcm, even if a primary imprint is repeated by this, this middle imprint object is not charged and development / rate of a primary imprint of a black toner imprinted primarily becomes good at the last.

[0019]

[The example of fruit **] The example of this invention is explained below based on drawing 2 . In addition, in this example, the same composition member as the image formation equipment used for the conventional method shown in drawing 1 attaches the same sign, and omits explanation. In drawing 2 , the black toner development counter 4 is arranged to the hand of cut of the photo conductor drum 1 at the downstream of the color toner development counters 5a, 5b, and 5c.

[0020] The example of this invention method is explained below using this composition. The photo conductor drum 1 begins rotation by the copy operation start signal, the photo conductor drum 1 is charged in predetermined potential with the electrification vessel 2, and a latent image is formed of a photographic filter 3. The latent image formed on the photo conductor drum 1 moves according to rotation of the photo conductor drum 1, any one of the color toner development counters 5a, 5b, and 5c approaches the photo conductor drum 1 first, and a latent image is developed by the color toner.

[0021] In accordance with the above-mentioned developed image formation operation, the middle imprint belt 9 is also running by the peripheral speed and ***** of the photo conductor drum 1. The developed image by the color toner on the above-mentioned photo conductor drum 1 which moved to the primary imprint position where the photo conductor drum 1 and the middle imprint belt 9 contact The middle imprint belt 9 imprints and a primary imprint is performed by the voltage of the toner impressed to the primary transfer roller 6, and reversed polarity, for example, an operation of the electric field produced by +500-+3000V.

[0022] By changing the color toner development counters 5a, 5b, and 5c, and repeating the above-mentioned process successively, after the developed image by the color of 3 color piles is primarily imprinted on the middle imprint belt 9, the developed image by the black toner is

developed on the photo conductor drum 1 by the black toner development counter 4, and, subsequently to the middle imprint belt 9 top, this is imprinted primarily. And the primary imprint image by the superposition of each color on this middle imprint belt 9 is immediately imprinted primarily by the imprint form 17.

[0023] Each operation of the secondary imprint to up to the imprint form 17 of this primary imprint image is still the same as formation of the developed image to the photo conductor drum 1 top by the toner of each above-mentioned color and the primary imprint of a up to [the middle imprint belt 9 of this developed image], and the above-mentioned conventional thing. Moreover, the same is said of the front face of the photo conductor drum 1 being cleaned with the photo conductor drum cleaner 7 for every development of each color.

[0024] Although the polyimide (PI), the polyvinylidene fluoride (PudF), the polyethylene terephthalate (PET), and the thing that mixed rheostatic control agents, such as carbon black (CB), in the poly carbo network (PC), and set the volume resistivity to $10^7 - 10^{14}$ -ohmcm were used for the material of the middle imprint belt 9 used in this example, that [its] this volume resistivity of whose is $10^8 - 10^{12}$ -ohmcm by reason which is mentioned later was desirable. Moreover, since a mechanical strength is lacking and the injury on a belt crease, a tear, etc. occurs when the thickness of this middle imprint belt 9 is 50 micrometers or less, it is necessary to make the thickness thicker than 50 micrometers.

[0025] In addition, measurement of the volume resistivity of the above-mentioned middle imprint belt 9 was performed by Mitsubishi Petrochemical Hi-Resta. The electrode used for measurement is HR probe, and used the volume resistivity when impressing voltage 100V for 30 seconds. Moreover, the environment of a measurement place was maintained at the temperature of 20-25 degrees C, and 50 - 60% of humidity RH, and after it left the middle imprint object belt to measure under this environment for 4 hours or more, it measured.

[0026] Using above image formation equipment, it copied to the commercial color copy paper, and the surface potential of the middle imprint belt 9 after the primary imprint at that time was measured. Using the Trek tabulation side electrometer (model344), for measurement of surface potential, the probe 21 was separated from the middle imprint belt 9 50-10mm, and was installed in the position which counters the tension roll 12 grounded as shown at drawing 3 at it.

[0027] Thus, whenever it repeated the primary imprint when a volume resistivity was higher than 10^{12} -ohmcm as shown in drawing 4 when surface potential was measured, surface potential rose. If the copy image at this time is seen, in the color imprinted primarily later, concentration will be low, therefore the tint of the portion with which the toner more than a two color laps will have shifted.

[0028] On the other hand, when a volume resistivity was smaller than 10^{12} -ohmcm, as shown in drawing 4 , even if it repeated the primary imprint, surface potential hardly rose, but the good picture also with small copy image and gap of the tint of a portion with which the toner more than a two color laps, without concentration changing with colors was acquired. Moreover, since there was no reverse transcription of a black toner, a black character and **** were also reproduced good.

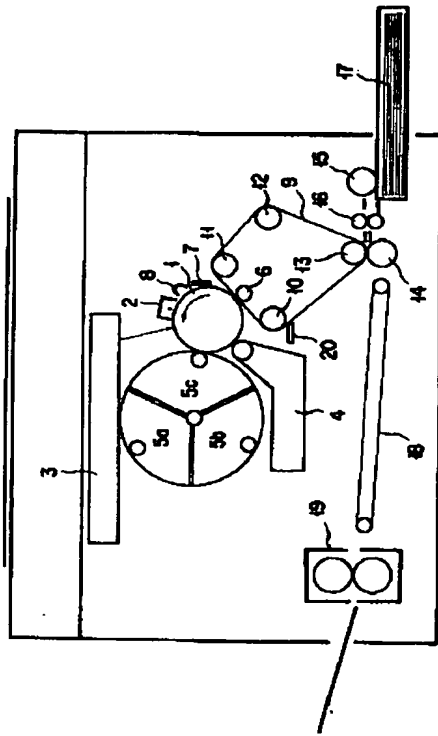
[0029] In addition, a volume resistivity is 10^8 . Although surface potential did not rise even if it repeated the primary imprint, as shown in drawing 4 when lower than 10^8 ohmcm, a picture with it was not acquired. [severe spilling of the toner of a copy image and] [good] Since the charge given to the tooth back of the middle imprint belt 9 spreads even besides an imprint nip through resistance of the middle imprint belt 9 in the primary imprint section, this is because a toner will be imprinted by the middle imprint belt 9 from the photo conductor drum 1, before the photo conductor drum 1 and the middle imprint belt 9 contact.

[0030]

[Effect of the Invention] By the image formation method concerning this invention, the effect that a clear black character without decline in the rate of an imprint and **** reappearance are obtained is done so.

[Translation done.]

Drawing selection [Representative drawing] 



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[JP,08-248779,A]

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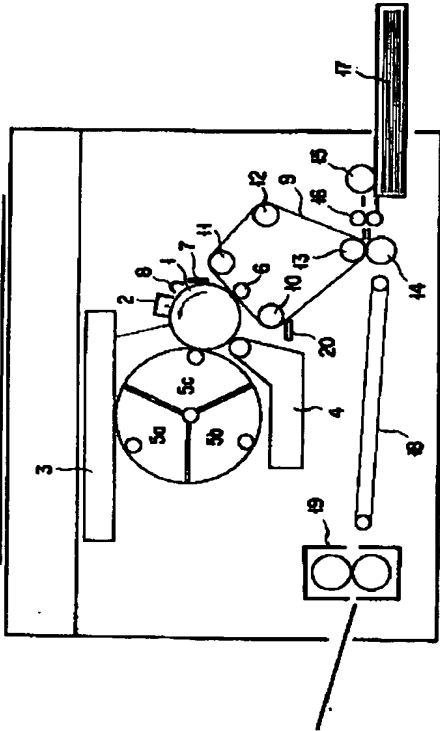
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TECHNICAL FIELD

[Industrial Application] this invention relates to the image formation method in color picture formation equipments which used the middle imprint object, such as an electrophotography copying machine and a printer.

[Translation done.]

Drawing selection [Representative drawing] ☐



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PRIOR ART

[Description of the Prior Art] Once imprinting primarily the toner image (developed image) formed on image supporters, such as a photo conductor drum, on middle imprint objects other than an imprint form as the image formation method (the imprint method) in color picture formation equipments, such as an electrophotography copying machine, the method of imprinting the toner image on a middle imprint object secondarily to up to an imprint form anew, and obtaining a copy image is learned.

[0003] And having the effect that generating of gap of the poor multiplex imprint by many factors, such as thickness of the maintenance state of an imprint form and an imprint form and the front-face nature of a lumbus and an imprint form, and color registration can be suppressed by using this method is known.

[0004] The image formation equipment shown in drawing 1 explains the conventional image formation method using this middle imprint object. In drawing 1, 1 is a photo conductor drum and rotates in the direction shown by the arrow all over drawing. Opposite arrangement of the electrification machine 2, a photographic filter 3, the black toner development counter 4, the color toner development counters 5a, 5b, and 5c, the primary transfer roller 6, the photo conductor drum cleaner 7, and the **** lamp 8 is carried out from the hand-of-cut upstream of this in the position which counters the front face of this photo conductor drum 1 at order.

[0005] Nine in drawing is the middle imprint belt arranged so that a part may contact the front face of the photo conductor drum 1 in a primary imprint position, this is laid [firmly] across the surroundings of a drive roll 10, the WOKU amendment roll 11, a tension roll 12, and the back up roll 13 for a secondary imprint, and the above-mentioned primary transfer roller 6 is arranged inside the contact section to the photo conductor drum 1 of this middle imprint belt 9.

Moreover, the secondary transfer roller 14 has countered the back up roll 13 for a secondary imprint.

[0006] The developed image by the toner imprinted by the middle imprint belt 9 by operation of the primary transfer roller 6 is imprinted in response to an operation of the secondary transfer roller 14 by the imprint form 17 fed with the feed roll 15 and the resist roll 16. And the imprint form 17 with which this developed image was imprinted is sent to a fixing assembly 19 with the conveyance belt 18, and it is fixed to it. 20 is a middle imprint belt cleaner which cleans the toner which remained on the middle imprint belt 9.

[0007] With the image formation equipment constituted as mentioned above, formation of a picture is performed as follows. That is, the photo conductor drum 1 begins rotation by the copy operation start signal, the front face of the photo conductor drum 1 is charged in predetermined potential with the electrification vessel 2, and a latent image is formed of a photographic filter 3. This latent image moves according to rotation of the photo conductor drum 1, and is developed by one of the black toner development counter 4 and the color toner development counters 5a, 5b, and 5c at the developed image by the toner of one color.

[0008] In accordance with the above-mentioned developed image formation operation, the

middle imprint belt 9 is also running by the peripheral speed and ***** of the photo conductor drum 1, the developed image by the toner on the above-mentioned photo conductor drum 1 which moved to the primary imprint position where the photo conductor drum 1 and the middle imprint belt 9 contact is imprinted by the middle imprint belt 9 by operation of the toner impressed to the primary transfer roller 6, and the electric field produced with the voltage of reversed polarity, and a primary imprint is performed.

[0009] On the other hand, it is removed by the photo conductor drum cleaner 7, the surface potential of the photo conductor drum 1 is discharged with the electric discharge lamp 8, and image formation operation of the following color is equipped with the toner which remained on the photo conductor drum 1 at this time. The developed image full color on the middle imprint belt 9 by which the multiplex imprint was carried out is obtained by changing the color toner development counters 5a, 5b, and 5c, and repeating the above-mentioned process successively.


[0010] During operation of the above primary imprint, it is estranged from the middle imprint belt 9 so that the secondary transfer roller 14 and the middle imprint belt cleaner 20 of a secondary imprint means may not disturb the developed image on the middle imprint belt 9, and the imprint form 17 sent out with the feed roll 15 is also standing by in the resist roll 16 neighborhood.

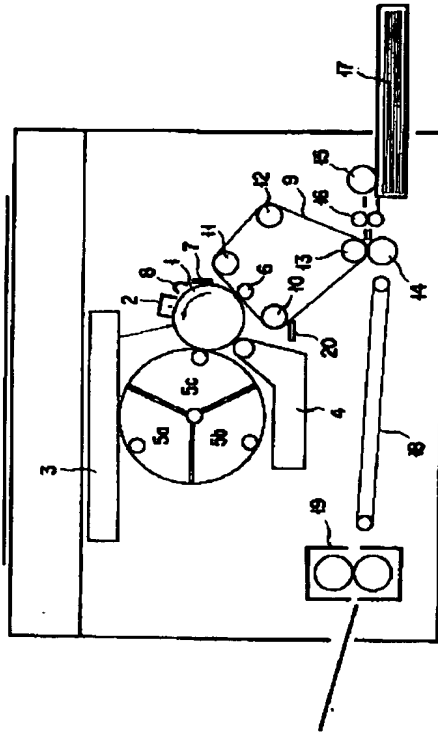
[0011] While the imprint form 17 is sent to a secondary imprint position with the resist roll 16 in accordance with the developed image on the middle imprint belt 9 which the primary imprint ended moving to a secondary imprint position, the secondary transfer roller 14 contacts the middle imprint belt 9. And current is given to the tooth back of the imprint form 17 by operation of the toner impressed to this secondary transfer roller 14, and the electric field produced with the voltage of reversed polarity, and the developed image on the middle imprint belt 9 is imprinted by this operation on the imprint form 17.

[0012] The conveyance belt 18 is adsorbed, the imprint form 17 which the secondary imprint ended is conveyed to a fixing assembly 19, and fixing is performed. The remains toner on the middle imprint belt 9 is removed by the middle imprint belt cleaner 20, and the next image formation operation is equipped with it.

[0013] In the color electrophotography equipment using above-mentioned intermediate field, since the middle imprint belt 9 was charged whenever it repeats a primary imprint, there was a problem that the rate of a primary imprint became low. On the other hand, with the technology indicated by JP,4-319968,A, in order to prevent the clearness of a black character and the linea nigra being lost by decline in this rate of an imprint, the method of developing and imprinting a black toner first is taken.

[Translation done.]

Drawing selection [Representativ drawing] 



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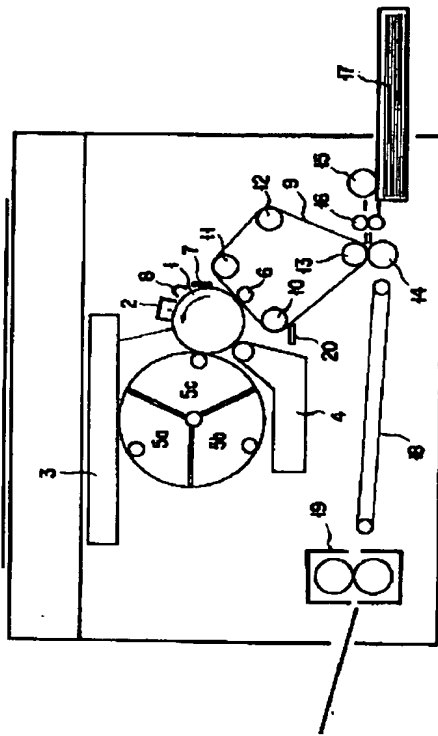
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EFFECT OF THE INVENTION

[Effect of the Invention] By the image formation method concerning this invention, the effect that a clear black character without decline in the rate of an imprint and linea-nigra reappearance are obtained is done so.

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Drawing selection [Representative drawing] 



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TECHNICAL PROBLEM

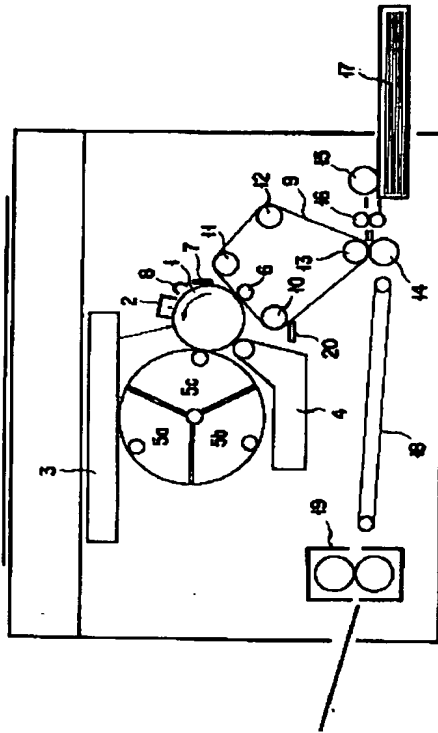
[Problem(s) to be Solved by the Invention] However, when the conventional method mentioned above was used, it had the following problems. The middle imprint hair side of belt side is smoother than paper etc. in order to prevent poor cleaning. Therefore, the adhesion force to the middle imprint belt of the toner of the developed image primarily imprinted on this middle imprint belt is weak compared with the adhesion force to paper, and the toner of the developed image primarily imprinted on the middle imprint belt is easy to carry out reverse transcription to the photo conductor drum 1 at the time of the imprint of the following color.

[0015] Therefore, first, whenever the toner of development / developed image imprinted primarily repeats the primary imprint of a developed image besides after that, reverse transcription of it is carried out, and its amount of toners finally imprinted on an imprint form will decrease remarkably. Therefore, although shown in JP,4-319968,A, like, development / the amount of black toners which will be imprinted on copy material as mentioned above if it imprints primarily decreased remarkably, and the clear black character and the problem that reappearance of **** was not obtained had generated the black toner first.

[0016] this invention aims at offering the image formation methods, such as an electrophotography copying machine using the clear black character which was made in view of the above-mentioned thing, and does not have decline in the rate of an imprint, and the middle imprint object which enabled reappearance of ****.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the image formation method concerning this invention The yellow and Magenta which were charged in the latent image formed on the image support, the color toner of cyanogen, And after developing negatives with a black toner, imprinting each developed image on a middle imprint object primarily and laying it on top of it one by one with the imprint means which impressed the voltage of a toner and a reverse pole In the image formation method which formed the full color picture by imprinting secondarily to other imprint material After the above-mentioned middle imprint object's having the half-conductivity of 108-1012-ohmcm and imprinting each developed image by yellow, the Magenta, and cyanogen on a middle imprint object, it is made to imprint the developed image by the black toner on a middle imprint object.

[0018]

[For **] By this image formation method, since the developed image by the black toner is primarily imprinted after imprinting the developed image by yellow, the Magenta, and cyanogen primarily on a middle imprint object, reverse transcription of the black toner is not carried out to the image support which is a photo conductor. And when the middle imprint object has the half-conductivity of 108-1012-ohmcm, even if a primary imprint is repeated by this, this middle imprint object is not charged and development / rate of a primary imprint of a black toner imprinted primarily becomes good at the last.

[0019]

[The example of fruit **] The example of this invention is explained below based on drawing 2 . In addition, in this example, the same composition member as the image formation equipment used for the conventional method shown in drawing 1 attaches the same sign, and omits explanation. In drawing 2 , the black toner development counter 4 is arranged to the hand of cut of the photo conductor drum 1 at the downstream of the color toner development counters 5a, 5b, and 5c.

[0020] The example of this invention method is explained below using this composition. The photo conductor drum 1 begins rotation by the copy operation start signal, the photo conductor drum 1 is charged in predetermined potential with the electrification vessel 2, and a latent image is formed of a photographic filter 3. The latent image formed on the photo conductor drum 1 moves according to rotation of the photo conductor drum 1, any one of the color toner development counters 5a, 5b, and 5c approaches the photo conductor drum 1 first, and a latent image is developed by the color toner.

[0021] In accordance with the above-mentioned developed image formation operation, the middle imprint belt 9 is also running by the peripheral speed and **** of the photo conductor drum 1. The developed image by the color toner on the above-mentioned photo conductor drum 1 which moved to the primary imprint position where the photo conductor drum 1 and the middle imprint belt 9 contact The middle imprint belt 9 imprints and a primary imprint is performed by the voltage of the toner impressed to the primary transfer roller 6, and reversed

polarity, for example, an operation of the electric field produced by +500--+3000V.

[0022] By changing the color toner development counters 5a, 5b, and 5c, and repeating the above-mentioned process successively, after the developed image by the color of 3 color piles is primarily imprinted on the middle imprint belt 9, the developed image by the black toner is developed on the photo conductor drum 1 by the black toner development counter 4, and, subsequently to the middle imprint belt 9 top, this is imprinted primarily. And the primary imprint image by the superposition of each color on this middle imprint belt 9 is immediately imprinted primarily by the imprint form 17.

[0023] Each operation of the secondary imprint to up to the imprint form 17 of this primary imprint image is still the same as formation of the developed image to the photo conductor drum 1 top by the toner of each above-mentioned color and the primary imprint of a up to [the middle imprint belt 9 of this developed image], and the above-mentioned conventional thing. Moreover, the same is said of the front face of the photo conductor drum 1 being cleaned with the photo conductor drum cleaner 7 for every development of each color.

[0024] Although the polyimide (PI), the polyvinylidene fluoride (PudF), the polyethylene terephthalate (PET), and the thing that mixed rheostatic control agents, such as carbon black (CB), in the poly carbo network (PC), and set the volume resistivity to $10^7 - 10^{14}$ -ohmcm were used for the material of the middle imprint belt 9 used in this example, that [its] this volume resistivity of whose is $10^8 - 10^{12}$ -ohmcm by reason which is mentioned later was desirable. Moreover, since a mechanical strength is lacking and the injury on a belt crease, a tear, etc. occurs when the thickness of this middle imprint belt 9 is 50 micrometers or less, it is necessary to make the thickness thicker than 50 micrometers.

[0025] In addition, measurement of the volume resistivity of the above-mentioned middle imprint belt 9 was performed by Mitsubishi Petrochemical Hi-Resta. The electrode used for measurement is HR probe, and used the volume resistivity when impressing voltage 100V for 30 seconds. Moreover, the environment of a measurement place was maintained at the temperature of 20-25 degrees C, and 50 - 60% of humidity RH, and after it left the middle imprint object belt to measure under this environment for 4 hours or more, it measured.

[0026] Using above image formation equipment, it copied to the commercial color copy paper, and the surface potential of the middle imprint belt 9 after the primary imprint at that time was measured. Using the Trek tabulation side electrometer (model344), for measurement of surface potential, the probe 21 was separated from the middle imprint belt 9 50-10mm, and was installed in the position which counters the tension roll 12 grounded as shown at drawing 3 at it.

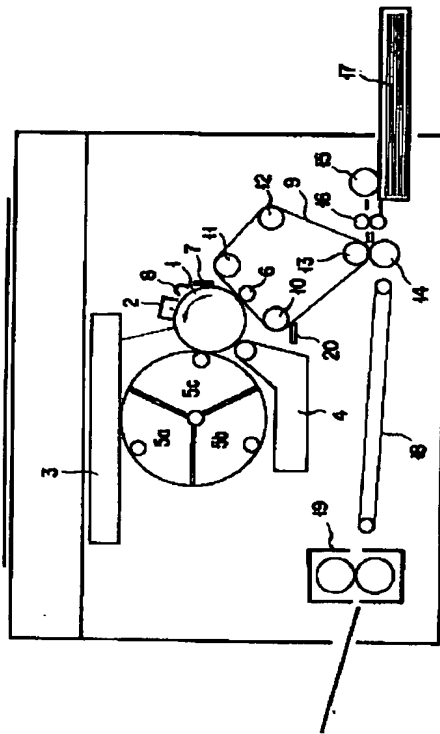
[0027] Thus, whenever it repeated the primary imprint when a volume resistivity was higher than 10^{12} -ohmcm as shown in drawing 4 when surface potential was measured, surface potential rose. If the copy image at this time is seen, in the color imprinted primarily later, concentration will be low, therefore the tint of the portion with which the toner more than a two color laps will have shifted.

[0028] On the other hand, when a volume resistivity was smaller than 10^{12} -ohmcm, as shown in drawing 4 , even if it repeated the primary imprint, surface potential hardly rose, but the good picture also with small copy image and gap of the tint of a portion with which the toner more than a two color laps, without concentration changing with colors was acquired. Moreover, since there was no reverse transcription of a black toner, a black character and the linea nigra were also reproduced good.

[0029] In addition, a volume resistivity is 10^8 . Although surface potential did not rise rather than omegacm even if the low case also repeated the primary imprint, as shown in drawing 4 , a picture with it was not acquired. [severe spilling of the toner of a copy image and] [good] Since the charge given to the tooth back of the middle imprint belt 9 spreads even besides an imprint nip through resistance of the middle imprint belt 9 in the primary imprint section, this is because a toner will be imprinted by the middle imprint belt 9 from the photo conductor drum 1, before the photo conductor drum 1 and the middle imprint belt 9 contact.

[Translation done.]

Drawing selection [Representative drawing] 



[Translation done.]

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JAPANESE

[JP,08-248779,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

*** NOTICES ***

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the image formation equipment which enforces the image formation method using the conventional middle imprint object.

[Drawing 2] It is the block diagram showing the image formation equipment which enforces the image formation method using the middle imprint object concerning this invention.

[Drawing 3] It is drawing showing the operation in the example of this invention.

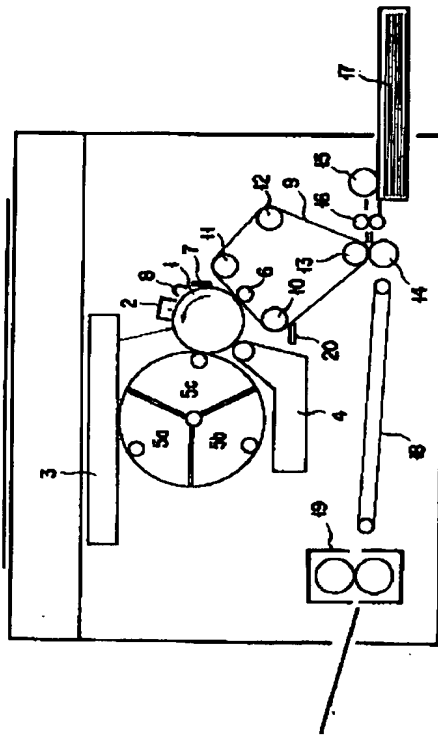
[Drawing 4] It is drawing showing the operation in the example of this invention.

[Description of Notations]

1 [-- A photographic filter, 4 / -- Black toner development counter,] -- A photo conductor drum, 2 -- An electrification machine, 3 5a, 5b, 5c [-- Photo conductor drum cleaner,] -- A color toner development counter, 6 -- A primary transfer roller, 7 9 [-- A secondary imprint back up roll, 14 / -- A secondary transfer roller, 15 / -- A feed roll, 16 / -- A resist roll, 17 / -- An imprint form, 18 / -- A conveyance belt, 19 / -- A fixing assembly, 20 / -- A middle imprint belt cleaner, 21 / -- Probe.] -- A middle imprint belt, 10 -- A drive roll, 13

[Translation done.]

Drawing selection [Representative drawing] 



[Translation done.]

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JAPANESE

[JP,08-248779,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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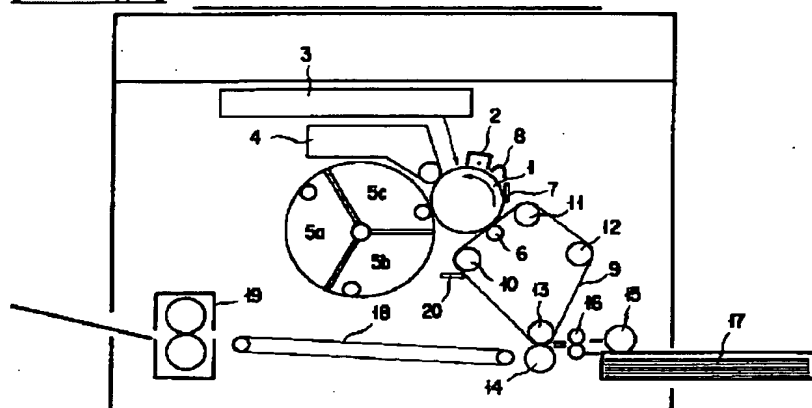
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

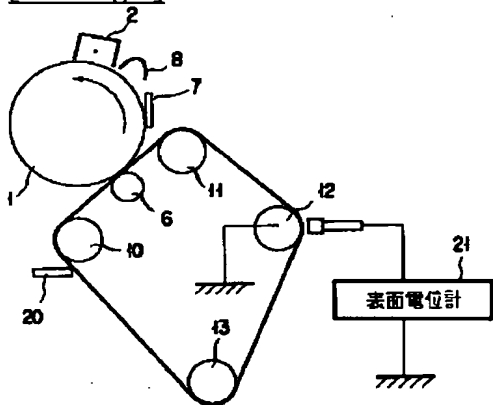
3.In the drawings, any words are not translated.

DRAWINGS

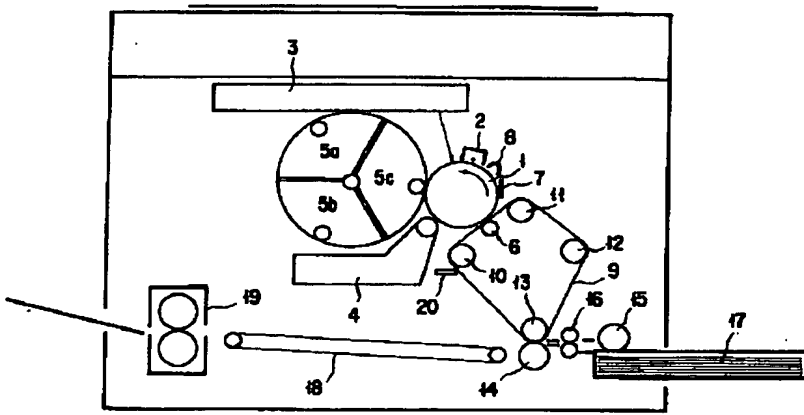
[Drawing 1]



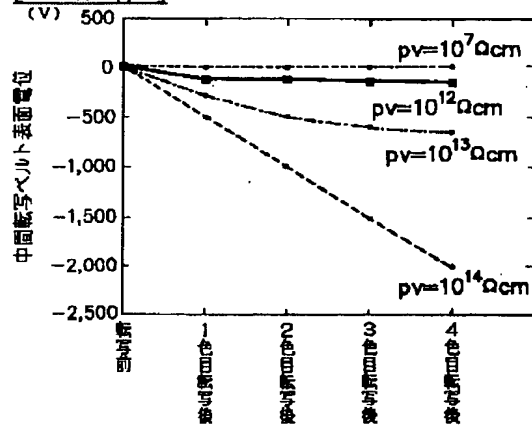
[Drawing 3]



[Drawing 2]

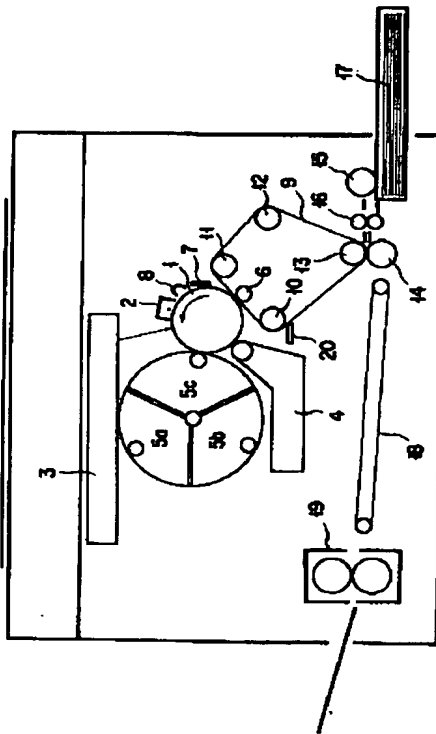


[Drawing 4]



[Translation done.]

Drawing selection [Representative drawing] ☒



[Translation done.]

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う問題があった。これに対して特開平4-319968号公報に開示された技術では、この転写時の低下により黒文字、黒線の鮮明度が失われるのを防ぐために、最初に黒トナーを現像して転写する方法がとられている。

【0014】
【発明が解決しようとする課題】しかしながら、上述した従来の方法を用いる場合、以下のようない問題を有していた。中間転写ベルトの表面は、クリーニング不良を防止するため、紙などより平滑になっている。そのため、この中間転写ベルト上に一次転写された現像像のトナーは、中間転写ベルトに対する付着力は、紙に対する付着力に比べて弱くなっている。中間転写ベルト上に一次転写された現像像のトナーが、次の色の転写時に感光体ドラム上に逆転写しやすくなっている。

【0015】従って、最初に現像／一次転写された現像像のトナーは、その後他の現像像の一次転写を繰り返す度に、逆転写されていき、最終的に転写用紙上に転写されるトナー量が著しく少なくなってしまうことになる。よって、特開平4-319968号公報に示されるもののように、黒トナーを最初に現像／一次転写すると、上述のように複写材上に転写される黒トナー量が著しく少なくなり、鮮明な黒文字、黒線の再現が得られないという問題が発生した。

【0016】本発明は上記のことにかんがみながらなされたもので、転写時の低下のない鮮明な黒文字、黒線の再現を可能にした中間転写体を用いた電子写真複写機等の画像形成方法を提供することを目的とするものである。

【0017】

【課題を解決するための手段】上記目的を達成するため、本発明に係る画像形成方法は、像担持体上に形成された潜像を、帯電したイエロー、マゼンタ、シアンのカラートナー、及び黒トナーで現像し、各現像像をトナーと逆接の電圧を印加した転写手段にて順次中間転写体上に一次転写して重ね合わせるから、他の転写材へ二次転写することによりフルカラー画像を形成するようにした画像形成方法において、上記中間転写体が $10^8 \sim 10^{12}$ Ω cmの半導電性を有し、かつイエロー、マゼンタ、シアンによる各現像像を中間転写体に転写した後に、黒トナーによる現像像を中間転写体上に転写するようにしている。

【0018】

【作 用】この画像形成方法では、イエロー、マゼンタ、シアンによる現像像を中間転写体上に一次転写した後に、黒トナーによる現像像が一次転写されるので、黒トナーが感光体である像担持体に進退転写されることがない。そして中間転写体が $10^8 \sim 10^{12}$ Ω cmの半導電性を有していることにより、これに一次転写が繰り返されても、この中間転写体が帯電することがなく、最後の現像／一次転写される黒トナーの一次転写率がよくなくなる。

【0019】本発明の実施例を図2以下に基づいて説明する。なお、この実施例において、図1に示した従来の方法に用いる画像形成装置と同一構成部材は同一符号を付して説明を省略する。図2において、黒トナー現像器4は、感光体ドラム1の回転方向に対して、カラートナー一現像器5a、5b、5cの下流側に配置されている。

【0020】この構成を用いて本発明方法の実施例を以下に説明する。複写動作開始信号により感光体ドラム1が回転をはじめ、帯電器2により感光体ドラム1が所定の電位に帯電され、露光器3により潜像が形成される。感光体ドラム1上に形成された潜像は感光体ドラム1の回転に従って移動し、まずカラートナー現像器5a、5b、5cのうちいずれか1つが感光体ドラム1に近づいて潜像がカラートナーにより現像される。

【0021】上記現像像形成動作にあわせて中間転写ベルト9も感光体ドラム1の周速と略同速で走行しており、感光体ドラム1と中間転写ベルト9が当接する一次転写位置へ移動した上記感光体ドラム1上のカラートナー転写位置は、一次転写ロール6に印加されたトナーと逆接性の電圧、例えば $+500 \sim +3000$ Vにより生じる電界的作用により、中間転写ベルト9に転写され、一次転写が実行される。

【0022】上記プロセスを順次カラートナー現像器5a、5b、5cを逐次して繰り返すことで、中間転写ベルト9上に3色重なるカラーによる現像像が一次転写された後に、黒トナー現像器4により感光体ドラム1上に黒トナーによる現像像が現像され、ついでこれが中間転写ベルト9上に一次転写される。そしてこの中間転写ベルト9上の各色の重ね合わせによる一次転写像は直ちに転写用紙17に一次転写される。

【0023】上記各色のトナーによる感光体ドラム1上への現像像の形成及びこの現像像の中間転写ベルト9上への一次転写、さらにこの一次転写像の転写用紙17上への二次転写の各動作は上述の従来のものと同一である。

【0024】この実施例にて、用いた中間転写ベルト9の材料は、ポリイミド(Pi)、ポリフッ化ビニリデン(Pvdf)、ポリエチレンテレフタレート(PET)や、ポリカーボネイト(PC)にカーボンブラック(CB)等の抵抗制御剤を混入して、体積抵抗率が $10^7 \sim 10^{14}$ Ω cmにしたものを用いたが、後述するような理由により、この体積抵抗率が $10^8 \sim 10^{12}$ Ω cmのものが望ましい。またこの中間転写ベルト9の厚さが $50 \mu\text{m}$ 以下の場合、機械的強度が足りず、ベルト折れ、発熱等の損傷が発生するので、その厚さは $50 \mu\text{m}$ より厚くする必要がある。

【0025】なお、上記中間転写ベルト9の体積抵抗率

の測定は、三菱電機Hir-Restaで行なった。測定に用いた電極はHRプロブで、電圧 100 V を 30 秒間印加したときの体積抵抗率を用いた。また測定場所の環境は、温度 $20 \sim 25^\circ\text{C}$ 、湿度 $50 \sim 60\% \text{ RH}$ に保たれており、測定する中間転写ベルトをこの環境下に4時間以上放置してから測定を行なった。

【0026】上記の画像形成装置を用いて、市販のカラーコピー用紙に複写し、そのときの一次転写後の中間転写ベルト9の表面電位を測定した。表面電位の測定にはTrek社製表面電位計(model 344)を用い、そのプローブ21を図3に示すように接触させたデングシヨロール12に對向する位置に、中間転写ベルト9から $50 \sim 10 \text{ mm}$ 離して設置した。

【0027】このようにして表面電位を測定したところ、図4に示すように、体積抵抗率が 10^{12} Ω cmより高い場合、一次転写を繰り返す度に表面電位が上昇していった。このときの複写像をみると、後から一次転写した色ほど濃度が低くなっており、そのため二色以上のトナーが重なる部分の色彩がずれてしまった。

【0028】これに対して、体積抵抗率が 10^{12} Ω cmより小さい場合、図4に示すように一次転写を繰り返しても表面電位がほとんど上昇せず、複写像も色によって濃度が異なることなく、二色以上のトナーが重なる部分の色彩のずれも小さい良好な画像が得られた。また、黒トナーの逆転写がないので黒文字、黒線も良好に再現されていた。

【0029】なお、体積抵抗率が $10^8 \sim 10^9$ Ω cmよりも低い場合、図4に示すように一次転写を繰り返しても表面電位が上昇しなかったが、複写像のトナーの飛び散り

がひどく良好な画像が得られなかった。これは、一次転写部で中間転写ベルト9の背面に与えた電荷が、中間転写ベルト9の底質を通じて転写ニップの外にまで広がるため、感光体ドラム1と中間転写ベルト9が接触する前に感光体ドラム1から中間転写ベルト9にトナーが転写されてしまうためである。

【0030】

【発明の効果】この発明に係る画像形成方法では、転写時の低下のない鮮明な黒文字、黒線再現が得られるという効果を奏する。

【図面の簡単な説明】

【図1】従来の画像形成装置を用いた画像形成方法を実施する画像形成装置を示す構成図である。

【図2】本発明に係る中間転写体を用いた画像形成方法を表す画像形成装置を示す構成図である。

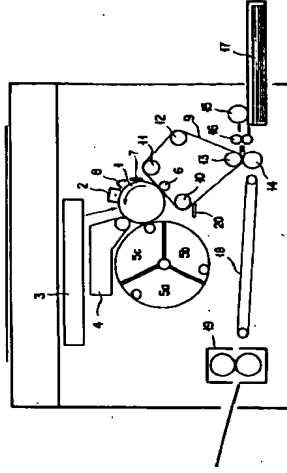
【図3】本発明の実施例における作用を示す図である。

【図4】本発明の実施例における作用を示す図である。

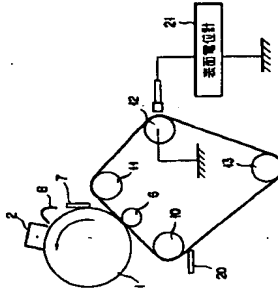
【符号の説明】

1…感光体ドラム、2…帯電器、3…露光器、4…黒トナー現像器、5a、5b、5c…カラートナー現像器、6…一次転写ロール、7…感光体ドラムクリーナー、9…中間転写ベルト、10…駆動ロール、13…二次転写バッキングアップロール、14…二次転写ロール、15…フイードロール、16…レジストロール、17…転写用紙、18…搬送ベルト、19…定着器、20…中間転写ベルトクリーナー、21…プローブ。

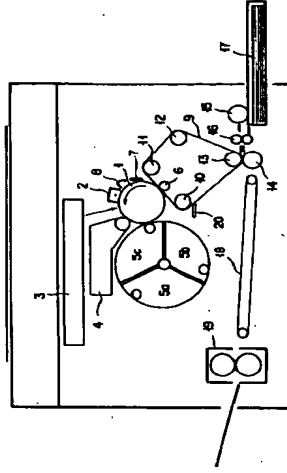
【図1】



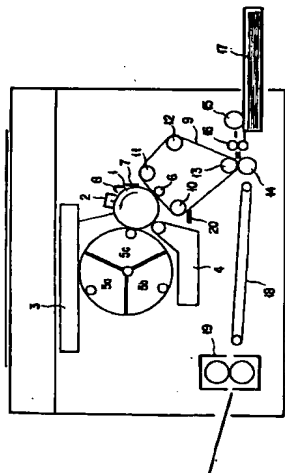
【図3】



【図4】



【図 2】



【図 4】

